

# **“Order n Eat”- Android App used during COVID Pandemic using Firebase**

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## **Abstract**

Food is essential for every living being to survive and humans being intelligent thought of modern ways to find food easier without much effort. This way of thinking led to the discovery of many modern applications which delivers food to them with just few clicks. We have created such application for android devices built on top of powerful services offered by Google. This application is exclusively made for the members and faculties of an organization so that the food can be delivered to them on time without having to wait in queue. This application was helpful to our organization during massive COVID outbreak.

**Keywords:** *Android application, Food ordering, Parcel management.*

## **1 Introduction**

Food ordering system has taken more advanced form in this modern world where all the food orderings are done through the online application. There are certain problems in the current system which requires customer to be present physically, wait till the food preparation is complete and ready to be served. These results in overcrowding which might lead to the transmission of the diseases and most well-known example would be Coronavirus Disease(COVID 19). If the customer is made to wait till his food preparation then it results in time wastage.

Avoiding the above problems will help to improve the efficiency of the people who work in the organization. Using mobile applications can be an easier and effective solution to the above problems. An application is a software that runs on the smartphones, smart televisions etc.[2]We have created an application called “Order ‘n’ Eat” designed to be used only by the members of the institutions. This application lets the members of the institutions to choose the restaurant, order their food items, pay the amount, collect the food items from the restaurant or get the food items delivered to their location. This application is made for android 4.1+ operating system. Android is a

Linux based operating system owned by Google.[1] This application helps in solving the problems such as wastage in time and overcrowding.

## 2 Literature Survey

Arushi Singh and Dr. Shilpi Sharma [1] proposed an android application to help the people to donate their books to others. People can register themselves to this application where they might be contacted by the other people to receive the book.

Anirban Sarkar et al. [2] gave a brief overview of the android application development, android architecture, cross platform approaches and android security. They also identified the different types of attacks and malwares that can ruin the application and how the android operating system manages and prevents these attacks.

Ann Janeth Garcia et al. [3] proposed an android application for the school students and the teachers to order the food items quickly. According to the authors, students and teachers can order their food items and get a QR code and this QR code will be scanned by people in the counter so the order is taken within seconds and the time is saved for the rest of the customers in the queue.

Nikita M. Lunawat et al. [4] proposed an android application for blood and organ donation. The donors and seekers can register into the application. The application provides Global Positioning System (GPS) facility for the donors to reach the hospitals, medical stores and blood bank location to save the time. The seekers can search for the blood donors and call them if needed.

Dian Pradhana Sugijarto et al. [5] proposed to introduce context awareness in mobile phones for blood donation. The authors claim that the problems that arise during the blood donation can be solved using a mobile application. They explained the features of a mobile application

named “Mobile Donation Assistant (MDA)” which includes checking announcement, checking donation history, making donation, notification and checking for campaign sites.

Sanjay Agarwal et al. [6] proposed an application where users can find those who are willing to donate food. According to the authors, the application uses Google maps, Application Programming Interface (API) to fetch the data from the cloud storage. The donors can upload the information on the remaining food items and the seekers can locate them using the application.

Shweta Shashikant Tanpure et al. [7] proposed an android application which can be used to place an order which will be sent to the kitchen and the cashier of the restaurant. The restaurant can view the orders and start preparing the food items. According to the authors, this application will save time and it is less expensive.

Ashutosh Bhargave et al. [8] proposed an application for digital food ordering in restaurant. According to the authors, the application has three different user interfaces. A tablet fixed on the table for the customer to order their food items, a tablet for the manager to manage food items and edit their prices, a display in the kitchen for the chef to prepare the food items. All devices are connected wirelessly and communicate together to improve the quality of serving the customers.

Michael Yosep Ricky et al. [9] proposed an application to order food items easily and a courier service to deliver the food items. The authors created a website for the restaurant and administrator to manage the food items and the received order and an application for the courier to track the order and deliver the order.

XU Hongzhen et al. [10] proposed an application for a wireless food ordering system which uses web services and wireless technologies. The application uses both wired

and wireless users. Wired users use PC and wireless users use PDA. The authors claim that the application is built based on secure web service architecture, reduces human error, improves efficiency of the restaurant and improves quality of the customer service.

### **3 Proposed Work**

#### **3.1 Limitations of the present system**

Present system has the following limitations, 1. Time wastage. 2. Over-crowding. 3. Ambiguity in the status of the food availability. 4. Ambiguity in the status of the restaurant.

3.1.1 Time Wastage: The customers have to wait for the food to be ordered, prepared and delivered. This results in wastage in time for the customers as it is necessary for them to present physically.

3.1.2 Over-Crowding: Over-crowding is another common problem in most of the institutions and organizations. This results in problems such as faster transmission of the diseases, congestion near the restaurants or shops.

3.1.3 Ambiguity in the status of the food availability: Often when customers are made to order their food physically there is a greater possibility that the food might not be available or even there are possibilities that the food might not be available when the customers are half way in the queue. This again contributes to the time wastage for the customers.

3.1.4 Ambiguity in the status of the restaurant: It is not possible in the current system to know the status of the restaurant whether the shop is opened or not unless the person is present physically to confirm which results in time wastage.

#### **3.2 Proposed System**

The proposed system solves all the limitations of the present system. Our proposed

solution is a mobile application which exploits the advantages of the prevailing technologies in order to facilitate the customers to overcome all the limitations of the present system.

3.2.1 Time Wastage: By using a mobile application customers are able to order their food items online and only collect the food when their order is ready to be delivered. This saves a lot of time for the customers and they can focus on their work while the food is being prepared.

3.2.2 Over-Crowding: Since the customers use application to order their food and only collect their food after preparation over-crowding can be avoided. This will also reduce the congestion near the shops and will pave the way for the customers who can't order their food online. By eliminating over-crowding transmission of the diseases such as COVID 19 is reduced to great extent.

3.2.3 Unambiguity in the status of the food availability: By using this application customers will know whether the food they wish to order is available or not. This will help the customers in deciding their alternatives and also save time.

3.2.4 Unambiguity in the status of the restaurant: This application allows the customers to know whether the shop is opened or not. This will help the customers to quickly opt for other restaurants and save time. The status of the restaurant has to be updated by the vendors.

#### **3.3 Tradeoff between existing and proposed system**

There are situations where the present system works better than the proposed system. There are certain requirements for the proposed system,

##### **3.3.1 Hardware Requirements:**

a) Mobile Phone:

Smart Phone is the first important requirement as without smart phone it is not possible to place order or receive orders. If the vendor does not have a smart phone then they cannot be registered in the system. In this case the vendor needs to go with the present system.

### 3.3.2 Software Requirements:

b) Android 4.1(Jelly Bean)+ Operating System

Proposed system can be used only if there is an android 4.1+ based mobile phone with the customer at the time of ordering their food items and it is also necessary that the vendor is also equipped with the android 4.1+ based mobile phone to receive and monitor the orders. We choose Android 4.1+ because it can reach wider users. Most of the android users today use the android version which is greater than Android 4.1 as any Android mobile phone that is getting released on the market is guaranteed to have android version more than 4.1. Existing system serves better if in case the requirement for the proposed system is not met. The application also depends on vendors to update the status of the restaurant and food availability. If all the requirements are met and vendors update the status regularly, this application will serve well and will definitely avoid all the limitations of the present system.

### 3.4 Estimated comparison of Present and Proposed System

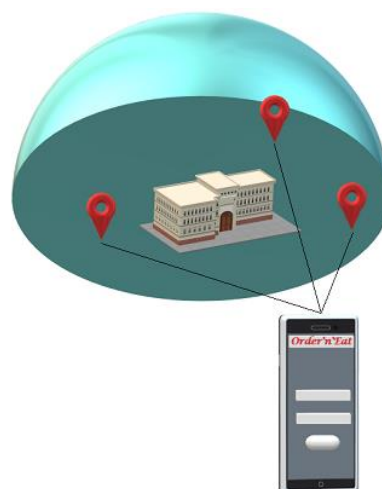
**Table.1. Present and Proposed System Comparison**

Parameters	Present System	Proposed System
Average Waiting Time during Normal hours	5 - 10 minutes	Negligible
Average Waiting Time during Peak	20 - 25 minutes	5 - 10 minutes

hours		
Crowd level during Normal hours	Low	Low
Crowd level during Peak hours	Very high	Medium

### 3.5 Scope of the application

**Fig.1. Application Scope**



**3.5.1 Location:** We propose that the scope of the application in terms of location to be within or near the boundaries of the organization or institution. Any shop or restaurant is to be present within the campus or near the campus to be registered in the application. The location scope can be changed by the institute authorities. Since institute authorities are the one who are registering the vendors, they can decide which restaurants can be registered based on the distance from the institute. Members of the institution often do not prefer to collect their food if the restaurant is far away and since this application is exclusively made for the insitution to manage the food parcels it is better to have location of the restaurant restricted to the institute campus or near the campus.

**3.5.2 Users:** There are three main users who actively participate in this system which will be

covered in detail in the next section. Only the members of the institution will be able to order their food items through this application. Vendors will be able to login to this application if their restaurant or shop satisfies the location scope and registered as vendor after verification from the institute authorities. Vendors won't be able to order the food items from any other restaurants. Vendors will only receive the orders and payment. Admins or institute authorities can register the vendors and manage which vendors can receive orders from the institute members. Admins can themselves order food from the restaurants just like institute members.

## 4 Design And Implementation

### 4.1 Architecture Diagram:

Fig.2. Architecture diagram

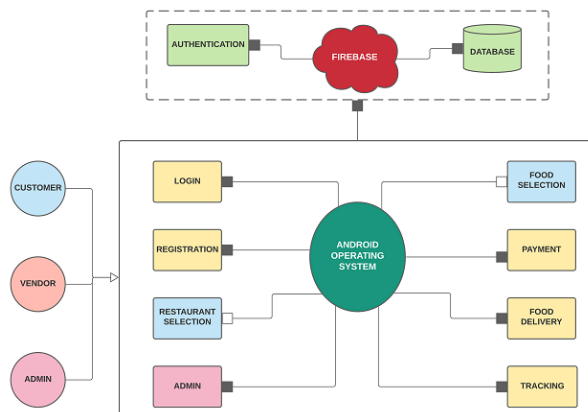


Fig.2 displays the system architecture consisting of three users Customer, Vendor and Admin, an application which runs on android operating system with eight modules and a firebase to manage authentication and for storage and retrieval of the data.

#### 4.1.1 Users

c) Customer: Customers are the main primary actors of the system. They are the ones who belong to the institution and who can order and receive the food items from the restaurant. Customers need to register and login into the application in order to use the application.

Customers are the main focus due to the fact the success of this new system depends on the customer satisfaction with the application User Interface. We made this as a priority to give as much smooth experience for the customers.

d) Vendor: Vendors are those who register in the application for the purpose of selling their food items to the customers. Vendors cannot be directly registered into the application. Administrators have to register the vendors after verifying the restaurant and if the vendor registration is legit. As discussed in the scope of the application section is crucial to choose the right vendors considering the location of the restaurant as it can make a big difference in the customer experience.

e) Admin: Administrators are the super users of the system who can register the Vendor into the application after verifying the necessary details confirming that the restaurant is legit. Often administrators are the staff members of the institutions.

#### 4.1.2 Android Operating System

Android operating system is one of the famous and widely used open source operating system around the globe. Android operating system consists of libraries which can be used to design and run applications. Applications are software programs that can execute predefined set of instructions to accomplish a specified task. This android application named “Order’n’Eat” is created using android studio and is designed with the help of Google’s material design. This application consists of eight modules. These modules are necessary for the proper working of the application.

f) Registration: Registration module is the first module that gets executed when a new person registers into the application. This module allows only the members of the organization or the institution to register. This is done with the help of the email address consisting of institution domain. Correctness of the email address and the password is checked

and the module then lets the user to register into the system. Once the user is registered, a verification email is sent to the user.

g) Login: Login module is the second module which gets executed when a person is registered into the system. It checks for the correctness of the email and also checks whether the email is registered and verified and only then the user is allowed to login into the application. Users can reset their password using Forgot password option in the login. There is a redirect to the signup page for the new user to signup into the application. When a user clicks on forgot password option, a dialogs appears for the user confirmation and then a password reset email is sent to the user's given mail ID provided that the email is already registered.

h) Restaurant Selection: Restaurant selection module is where the user is allowed to select the restaurant. This module is accessible only when the user is successfully logged into the system. This module checks for the available and open restaurant and displays the restaurants to the user accordingly. This module is not available for the vendors.

i) Food Selection: Food selection module is where the user can select the food items. This module depends on the Restaurant Selection module. Food items will be displayed depending on the selection of the restaurant in Restaurant Selection module. Food selection module checks for the available food items in the restaurant at that time and displays it to the user accordingly. Food items are added to the cart depending on the selection. This module is not available for the vendors.

j) Payment: Payment module allows the users to make payment directly to the vendor. It offers the users with two choices. Users can choose between Online payment or Cash on delivery.

k) Food Delivery: Food delivery module allows the customer to select between remote delivery of the food items or collect them manually from the restaurant. It also allows the customer to select the location of the delivery incase of remote delivery. This module provides vendor with necessary controls over the food delivery. It allows the vendor to notify the customers that their food is dispatched to their location or ready to be delivered incase if the customer chooses to get their food items directly from the restaurant.

l) Tracking: This module allows the user to track their food. It displays whether the food items that they ordered are in preparation stage or ready to be delivered or dispatched. This module allows the vendor to know whether the food item is delivered successfully to the customer.

m) Admin: Admin module is restricted to the administrators. This module allows the administrators to register the vendor and temporarily or permanently disable a user account.

#### 4.1.3 Firebase

Firebase is a platform developed by Google to help developers in building an application. The platform provides necessary Software Development Kits (SDK) and libraries to connect with the firebase and use the service offered by the firebase. SDK consists of necessary tools to facilitate creating an application. Libraries consist of functions to help the developers to connect to the firebase. Our application is registered with the firebase and we are using its authentication service to securely register and login the users into the system and also its database to securely store and retrieve the data from the database.

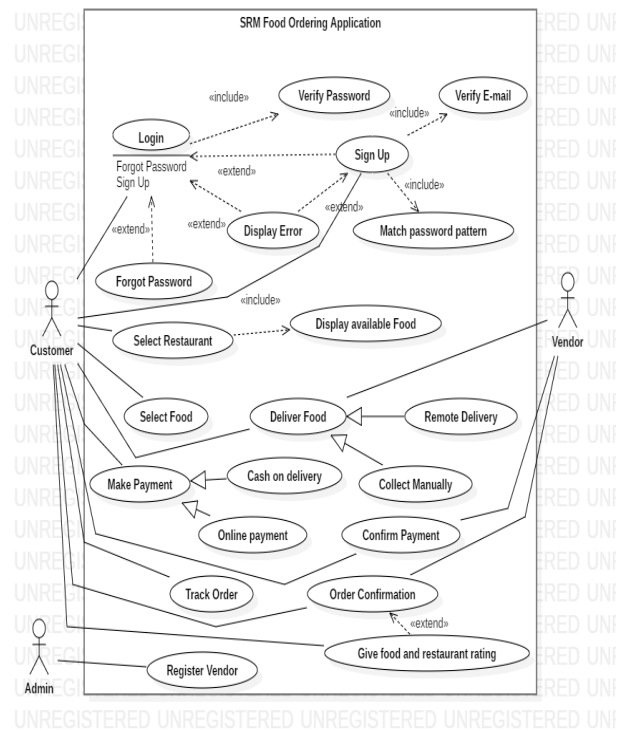
n) Authentication: It is important for any business and institution to have proper authentication as any breach in integrity of the application can be devastating. The

authentication that we used is provided by Google Firebase so it is guaranteed that the authentication is robust and secure. Authentication is one of the popular service offered by the firebase. The firebase provides necessary libraries to register and login the user into the system. We are using the firebase authentication to register the user, login the user, send verification email, reset the password, disable the user, delete the user and retrieve the User ID of the user. Every registered user will have a User ID which is used to get the information about the user, to execute the functions specific to that User ID and to maintain the session of the user.

o) Realtime Database: Database is top priority of any organization. Organizations invest more to ensure that the customer data are well protected because any breach in the data may reveal personal information of their members thereby causing devastating impact on the organization and users. Having the importance of the database in our mind we opted to use Google Firebase’s Realtime database. Firebase realtime database is a NoSQL cloud database where the application can store and retrieve the data of the user. Data of the users are synced to the database in realtime which means the data is immediately reflected to all the connected devices within fraction of a second. We use firebase database to store the user and restaurant data.

## 4.2 UML Design:

**Fig.3. Usecase diagram**



Usecase Diagram is a UML Design which is used to capture the requirements of the system. The usecase diagram in the Fig.3 is designed for the “Order’n’Eat” application. There are two primary actors and one secondary actors. The primary actors in the system are those who interacts with the system. Here the primary actors are Customer and Admin. The secondary actors are those who give response to the actions performed by the primary actors. Vendor is the secondary actor in the system.

Customer interacts with the login, signup, select restaurant, select food, make payment, confirm payment, track order and give food and restaurant rating usecases. Admin registers the Vendor into the system. Vendor interacts with the deliver food, confirm payment and order confirmation.

There are relationships in the use case. Relationships represent the connection between the usecases. There are also dependencies

where a usecase is dependent on another usecase and a change in one usecase may cause change in another usecase. Two dependencies are used in this diagram. Include and Extend. When a usecase1 includes usecase2 then usecase2 gets executed whenever usecase1 is executed so in short usecase1 cannot be complete without usecase2. When a usecase1 extends usecase2 then usecase2 may or may not execute when usecase1 is executed. It is not necessary that usecase2 to be executed whenever usecase1 is executed. Extension points are associated with the extend relationship and the points that are added to the base usecase(usecase1) to denote the usecases that the base usecase is extending to. Generalization is a relationship in the usecase diagram where two usecases combine to form a single usecase. In other words when ever there are choices to be made by the actors in the application and the choices are linked to a usecase then we can combine them with generalization.

Login usecase has the following extension points, Forgot password and signup. Login usecase includes the verify Password and extends signup, display error and forgot password which means whenever the user tries to login, their password will be verified automatically. Signing up and forgot password is optional and the user may or may not click on signup or forgot password and the error is displayed only on certain conditions. The Signup use case includes the verify email, match password pattern and extends display error which means whenever the user registers into the application their email is verified and password is checked for a pattern. Select restaurant includes daily available food usecase. Deliver food usecase is connected to the remote delivery and collect manually usecase through generalization. Here users have two options to opt and they can opt for any one from remote delivery or collect manually. Similarly make payment usecase is connected with the cash on delivery and online

payment usecases through generalization. Order confirmation extends the give food and restaurant rating usecase. Users may or maynot give their rating for the food and restaurant.

### 4.3 Methodology

**Fig.4. Customer Process Flow**

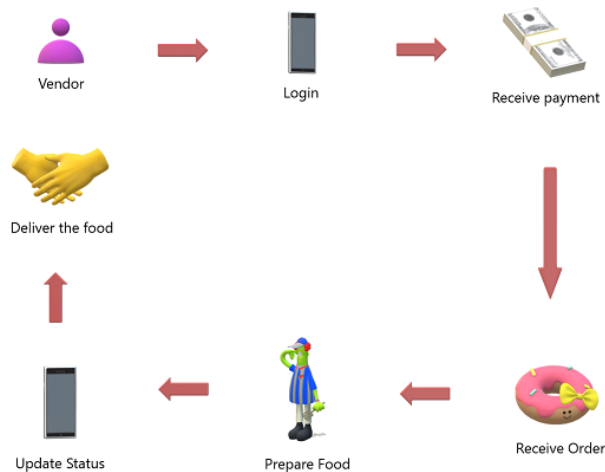


Fig.4. displays the process flow for the customers. The user is required to register into the system. Once after registration the user is required to verify their email ID through the link that is sent to their email. After verification users can login to the system. The application includes the following bottom navigation menus, 1) Status 2) Menu 3) Cart 4) Account. Status displays the status of the food items that the customers have ordered. Menu displays the available restaurants and food items. Cart consists of the orders that the customers have decided to place. Account consists of account information and a provision to change password etc. Once the customer is successfully logged in one can select the restaurant and choose their food from the available list of food items. Once the food items are selected, it is added to the cart. Customers can select whether they need their food to be delivered to their location or they could collect the food manually from the shop. They have to choose their location and can then proceed to payment. Once the payment options are confirmed and payment process is completed, the vendor gets the order details. Vendor then prepares the food and updates the status of the



food in the application which gets reflected to the customer portal under status menu of the bottom navigation. Vendor can then either dispatch the food items or deliver to the customer upon arrival to the shop. Customer gets the notification when the food is prepared and ready to be delivered or dispatched. Once the food is delivered successfully, the customer is given an option to give their rating for the food and the restaurant. Fig.5. displays the process flow for the vendors.

**Fig.5. Vendor Process Flow**



## 5 Conclusion

The “Order’n’Eat” application can be really helpful to many institutions which have large campuses. The paper has covered both business and technical perspective of the application. On business perspective, the application enables customers to focus more on their work and help save time by not waiting to place the order or retrieve the food items. It also helps vendors by better managing their orders and also helps vendors to prepare the food items for the orders which came first. The application does not charge any commission from either vendors or customers and any payments from the customers are credited directly to vendors’ accounts. On technical perspective, the application uses one of the advanced technology and cloud services offered by Google so users can expect zero to very less

down time which denotes that the application can be effectively relied upon by the institutions. It was also discussed that the authentication method was also offered by Google so the authentication is fast, easily manageable and secure. The backend of this application is also secure as it uses Google Firebase to store and retrieve data. We hope that this application will significantly improve the efficiency and quality of the customer service in the institutions.

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